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# Abstracts presented at the ESVS Annual Meeting in Porto on 23–25 September 2015

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## AAA Rupture Often Occurs Outside the Maximal Diameter Region and is Preceded by Rapid Local Growth and an Increased Biomechanical Rupture Risk Index

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**Introduction:** Rupture risk prediction of abdominal aortic aneurysms (AAA) relies on maximal diameter (Dmax) measurements. If Dmax exceeds 55 mm aortic surgery is considered beneficial. However, even small aneurysms rupture while some large aneurysms never rupture. Our objective was to study the size and location of ruptures in AA patients in our center and to relate the location and growth of the local rupture site to the Dmax. Furthermore, we studied whether the biomechanical rupture risk estimated using finite element analysis (FEA) could predict rupture.

**Methods:** All patients diagnosed with AAA rupture (treated or not treated) in our catchment area during the years 2009–2013 were included. 50 patients had undergone high quality computed tomography angiography examination. Dmax, orthogonally to the centerline, local diameter at the rupture site and its distance from the Dmax region was recorded. 14 patients had a previous CTA conducted within 2 years prior to AAA rupture. FEA was performed and Peak wall stress (PWS) and Peak wall rupture index (PWRI = maximal wall stress/wall strength ratio) were calculated using A4 Clinics software (VASCOPS, Austria).

**Results:** The median diameter at rupture was 77 mm. Two rAAAs (4%) had a Dmax $<$55 mm and five (10%) had a Dmax $<$60 mm. 50% of the 30 identified rupture sites were located outside the Dmax region. In the 14 patients with a pre-rupture CTA, PWRI was significantly higher than in the control group (0.41 vs. 0.34, $p = 0.005$) but no significant differences in PWS (212 vs. 197 kPa, $p = 0.20$) or maximal diameter (61 vs. 58 mm, $p = 0.23$) were detected. Diameter growth rate between the pre-rupture and rupture CTs was in 67% of the cases higher in the rupture region than in the Dmax region.

**Conclusion:** In this cohort of all consecutive rAAA patients (treated and not treated), a significant number of ruptured aneurysms had small diameters at rupture. Ruptures often occurred outside the maximal diameter area, sometimes in segments with a relatively small local diameter. In the small cohort of rupture patients with a pre-rupture CTA, FEA could predict AAA rupture. In addition, rupture sites were preceded by rapid local growth. Our results support the notion of considering the entire geometry of an aneurysm, rather than sole reliance on maximum diameter measurements.

## Comparison of Renal Outcomes in Matched Cohorts Treated by Zenith® Fenestrated and Zenith® AAA Stent Grafts in US Prospective Pivotal Trials

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**Introduction:** Fenestrated endovascular repair (FEVAR) has been increasingly utilized to treat complex abdominal aortic aneurysms (AAAs). The added risk of renal function deterioration as compared to patients undergoing infra-renal endovascular aortic repair (EVAR) has not yet been determined.

**Methods:** Patients with preserved renal function (eGFR $\geq$ 45 ml/min) enrolled in two prospective, non-randomized pivotal studies evaluating the Zenith® fenestrated and Zenith® AAA stent grafts (Cook Medical Inc., Bloomington IN) were matched (1:2) by propensity scores for age, gender, hypertension, diabetes, and pre-operative eGFR. There were 67 patients treated by FEVAR and 134 matched controls treated by EVAR. Mean follow up was 30 $\pm$ 20 months. Renal outcomes included acute kidney injuries defined by RIFLE criteria (Risk, Injury, Failure, Loss, End-stage) and changes in sCr, eGFR, and CKD staging up to 5 years. Renal duplex ultrasound follow up was obtained only in the FEVAR group.

**Results:** Acute kidney injury at one month were similar between groups with $>$50% decline in eGFR observed in 6% of FEVAR and 11% of EVAR patients ($P = 0.68$). There were no significant differences in $>$25% decline in eGFR at 2-years (20% vs. 20%; $P = 0.99$) and 5 years (27% vs. 50%, $P = 0.50$) between patients treated by FEVAR or EVAR, respectively. Progression to stage IV-V CKD was similar at 2-years (2% vs. 3%; $P = 0.99$) and 5 years (7% vs. 8%, $P = 0.94$) in the FEVAR and EVAR groups, with similar sCr and eGFR values up to 5 years. During follow up, there were more renal artery stenosis/occlusions (15/67 vs. 3/134, $P < 0.001$) and more renal related re-interventions (12/67 vs. 4/134, $p < 0.001$) in patients treated by FEVAR compared to EVAR, respectively. However, rate of progression to renal failure requiring dialysis was low and identical in both groups (1.4% vs. 1.4%, $P = 0.99$).

**Conclusion:** Endovascular aortic repair with fenestrated and infra-renal AAA stent grafts was associated with similar rates of renal function deterioration in patients who initially had preserved renal function. Renal-related re-interventions were higher following FEVAR, although net changes in renal function were similar in both groups. Surveillance of renal artery alignment stents is recommended to detect stenosis or occlusion after FEVAR. In patients with preserved renal function, the decision on type of repair should be based upon anatomical factors such as length of infra-renal aortic sealing zone and aneurysm involvement of the visceral arteries, rather than impact on renal function status.

## Can EVAS Win the Race Against EVAR? Our Experience with 50 Nellix Implantations.

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**Introduction:** The Nellix Endovascular Aneurysm Sealing (EVAS) has been proposed as an alternative to conventional endovascular aneurysm repair in attempt to deal with the limitations of this method, specifically, endoleaks and migration. The aim of the study was to present our experience in the treatment of patients with abdominal aortic aneurysms (AAA) with challenging neck anatomy.

**Methods:** From January 2014 to April 2015, 50 patients (43 male, 7 female), aged 56–87, underwent implantation of Nellix stent graft for AAA. In one case an emergency procedure was performed in a patient with secondary aneurysm rupture due to bifurcated stent graft migration. The procedures were performed under spinal (41) or general anesthesia (9).

**Results:** All procedures were completed without complications. In five cases the procedure was performed beyond instruction for use. Four renal

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